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526 Rec'd PCT/PTO 29 MAR 2000

March 29, 2000

BOX PCT

Assistant Commissioner for Patents
Washington, D.C. 20231

PCT/JP98/04362
-filed September 29, 1998

Re: Application of Naoki OKINO, Yutaka ISHIKAWA, Nobuyuki TANAKA, Yutaka MANO and Yasuhiro SHIBUYA
METHOD FOR FORMING A RESINOUS FRAME AND METHOD FOR PREPARING A PANEL WITH A RESINOUS FRAME USING THE SAME
Our Ref: Q58562

Dear Sir:

The following documents and fees are submitted herewith in connection with the above application for the purpose of entering the National stage under 35 U.S.C. § 371 and in accordance with Chapter II of the Patent Cooperation Treaty:

- ☐ an executed Declaration and Power of Attorney.
- ☑ an English translation of the International Application.
- ☑ 11 sheets of formal drawing (Figures 1-11).
- ☐ an English translation of Article 19 claim amendments.
- ☐ an English translation of Article 34 amendments (annexes to the IPER).
- ☐ an executed Assignment and PTO 1595 form.
- ☐ a Form PTO-1449 listing the ISR references, and a complete copy of each reference.
- ☑ a Preliminary Amendment

It is assumed that copies of the International Application, the International Search Report, the International Preliminary Examination Report, and any Articles 19 and 34 amendments as required by § 371(c) will be supplied directly by the International Bureau, but if further copies are needed, the undersigned can easily provide them upon request.

The Government filing fee is calculated as follows:

Total claims	12	-	20	=		x	$18.00	= $.00
Independent claims	4	-	3	=	1	x	$78.00	= $78.00
Base Fee								$840.00
TOTAL FEE								$918.00

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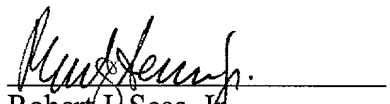
A check for the statutory filing fee of $918.00 is attached. You are also directed and authorized to charge or credit any difference or overpayment to said Account. The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16, 1.17 and 1.492 which may be required during the entire pendency of the application to Deposit Account No. 19-4880. A duplicate copy of this transmittal letter is attached.

Priority is claimed from September 30, 1997 based on Japanese Application No. 9-266741.

Respectfully submitted,



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Date: March 29, 2000

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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Naoki OKINO, et al.

Appln. No.: PCT/JP98/04362 Group Art Unit:

Filed: March 29, 2000 Examiner:

For: METHOD FOR FORMING A RESINOUS FRAME AND METHOD FOR PREPARING A PANEL WITH A RESINOUS FRAME USING THE SAME

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

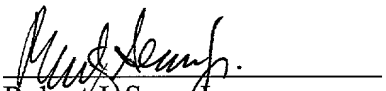
IN THE CLAIMS:

Please cancel claims 1-9 and add new claims 10-21 attached hereto.

REMARKS

The foregoing amendments are made, *inter alica,* in order to remove multiple dependencies and avoid the Government surcharge. Entry and consideration of this Amendment is respectfully requested.

Respectfully submitted,



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DESCRIPTION

METHOD FOR FORMING A RESINOUS FRAME AND METHOD FOR PREPARING A PANEL WITH A RESINOUS FRAME USING THE SAME

BACKGROUND OF THE INVENTION

TECHNICAL FIELD

The present invention relates to a method for forming a resinous frame. In particular, the present invention relates to a method for forming a resinous frame and a method for preparing a panel with a resinous frame using the same, which is appropriate when a side and a corner of a glass sheet are required to have different output amounts of a resin material applied thereto as in a case wherein a glass sheet has a resinous frame unified to plural sides thereof.

BACKGROUND ART

In Figure 4 is shown a perspective view of an example of a system for unifying a resinous bead to a periphery of a glass sheet. A glass sheet 1 is moved by a moving device 3 through a vacuum cup. The moving device 3 can carry out a positional shift of the glass sheet 1 and a rotational shift of the glass sheet 1 about an axis O perpendicular to the glass sheet. On the other hand, an extruder 4 extrudes a resinous material having a certain cross-sectional shape through a die 6 with a nozzle 7 having a certain cross-sectional shape. The glass sheet 1 has a resinous bead 5' unified to a periphery thereof by moving the glass sheet 1 by the

moving device 3 so as to make the periphery of the glass sheet 1 (sides 1a and corners 1b) followed the nozzle 7.

In Figures 5 and 6 are shown plan views of cases wherein the glass sheet 1 is moved by the moving device to continuously unify the bead 5' to the entire periphery of the glass sheet 1. The glass sheet 1 is shown to have the corners 1b formed in a rectangular shape in Figure 5, and the glass sheet 1 is shown to have the corners 1b formed in a circular arc shape in Figure 6. When the resinous bead 5' is unified to the sides 1a of the glass sheet 1, the operation can be carried out rapidly since the movement of the glass sheet 1 is linear. From this viewpoint, the output amount of the resinous material 5 for forming the bead 5' is great. On the other hand, with respect to the rectangular corners 1b, the positional shift of the glass sheet 1 is hold and the glass sheet 1 is rotated about the nozzle 7 when forming the bead on the corners 1b. In order to equalize the cross-sectional shapes of the bead 5' formed on the side 1a and the corners 1b, the output amount of the resinous material 5 onto the corners 1b with respect to a moving speed (in other words, an output amount per unit time; hereinbelow, the output amount means an output amount per unit time) is minimized.

In the case of the circular arc corners 1b as shown in Figure 6, the moving speed is reduced since the decelerated positional shift of the glass sheet 1 and the

rotational shift of the glass sheet 1 are simultaneously carried out likewise. In order to equalize the cross-sectional shape of the bead 5′, the output amount of a resinous material 5 onto the circular arc corners 1b with respect to the moving speed is required to be reduced.

In Figure 7 is shown a cross-sectional view of an example of a conventional extruder 4. The extruder 4 includes a measuring screw 9 in a main body 10, which is rotated by an extruder drive 8. The resinous material 5 is supplied into the main body 10 through a resinous material hopper 11, which is provided on an upper portion of an end of the main body 10. The supplied resinous material 5 is heated by heaters 12 in the main body 10 to be softened. The heated and softened resinous material 5 is fed to the die 6 from the other end of the main body by the measuring screw 9. The resinous material 5 fed to the die 6 thus is extruded in a certain cross-sectional shape from the nozzle 7 of the die 6 through a switching valve 13 in the die 6.

In the extruder 4, the measuring screw 9 is rotated at a certain speed by the extruder drive 8 in order to stabilize the temperature of the extruded resinous material 5. When the bead 5′ (Figures 5 and 6) is not formed on the glass sheet 1, the switching valve 13 is switched to discharge the entire amount of the fed resinous material 5 outside the system. When the output amount of the extruded resinous material is reduced, the

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switching valve 13 is switched to discharge a large portion of the fed resinous material 5 outside the system.

In Figure 8 is shown a graphical representation of relationships among a moving speed of the glass sheet (A), an output pressure from the extruder (B), an output amount from the extruder per unit time (C) and a discharge amount outside the system (D) wherein the extruder 4 of Figure 7 is employed to unify the resinous bead 5' to the glass sheet 1 having the rectangular corners 1b. The moving speed of the glass sheet is represented in a rectangular form in Figure 8 (A) since the movement and the halt of the glass sheet are carried out instantaneously. The output pressure of the extruder 4 is constant as shown in Figure 8 (B). When the bead is formed on the sides of the glass sheet, the output amount of the extruder (the output amount from the nozzle) is great as shown in Figure 8 (C) since the glass sheet is rapidly moved. When the bead is formed on the corners of the glass sheet, the output amount is minimized since the movement of the glass sheet is halted (though the glass sheet is rotated). Since the nozzle is open at that time, the pressure of the resinous material between the switching valve and the nozzle is released, and the actual output amount of the resinous material per unit time gently changes as indicated by "a" in Figure 8 (C). As a result, the resinous material is excessively fed to

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the glass sheet 1.

At a handling step for mounting the glass sheet on and dismounting the glass sheet through the moving device and at a step for forming the bead on the corners, the resinous material is discharged from the switching valve outside the system in a large amount as shown in Figure 8 (B).

In order to solve the problem of the excessive supply, a proposal has been made to change the rotational speed of the measuring screw so as to control the output amount. In Figure 9 is shown a graphical representation of relationships among a moving speed of a glass sheet (A), an output pressure from an extruder (B), an output amount from the extruder per unit time (C) and a discharge amount outside the system (D) in a case wherein the rotational speed of the measuring screw is controlled to form a bead on the glass sheet with rectangular corners. When the rotational speed of the measuring screw is controlled so as to be matched to the moving speed of the glass sheet shown in Figure 9 (A), the output pressure of the extruder can be changed so as to be matched to the moving speed of the glass sheet as shown in Figure 9 (B). By halting the extrusion by the extruder in a handling operation, the discharge amount of the resinous material outside the system can be significantly reduced as shown in Figure 9 (D).

However, even it is difficult to instantaneously

increase and decrease the output pressure of the extruder due to the presence of the inertia of the measuring screw as shown in Figure 9 (B) by controlling the rotational speed of the measuring screw (Figure 9 (B)). For this reason, the change in the output pressure becomes gentle as indicated by reference "b" in this Figure, and the output amount of the extruder changes gently as indicated in reference "b′" (Figure 9 (C)). Under the circumstances, the thickness of the bead 5′ formed on the corners 1b has been greater than that of the bead 5′ formed on the sides 1a since it is impossible to keep the output amount of the resinous material (the state shown in Figure 8 (C)) to a minimum when halting the glass sheet (when the bead 5′ is formed on the corners 1b of Figure 5). In the case of the glass sheet 1 with the circular arc shaped corners 1b as shown in Figure 6, a similar problem has also been raised though the degree of the increased thickness is slightly reduced.

It is an object of the present invention to provide a method for forming a resinous frame, which is appropriate to change the output amount of a resinous material per unit time, and a method for preparing a panel with a resinous frame using the same.

DISCLOSURE OF THE INVENTION

The present invention provides a method for forming a resinous frame wherein a resinous material is extruded through a die with a nozzle having a certain cross-

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sectional shape to be formed so as to have a certain cross-sectional shape substantially conforming to the cross-sectional shape of the nozzle, characterized in that an injection machine having a plunger is provided upstream of the die, the injection machine injects the resinous material toward the die, and the resinous material is extruded through the die.

The present invention also provides a method for forming a resinous frame wherein a resinous material is extruded through a die with a nozzle having a certain cross-sectional shape to be formed so as to have a certain cross-sectional shape substantially conforming to the cross-sectional shape of the nozzle, characterized in that an injection machine is provided on an upstream side of the die, a resinous material, which is supplied through a resinous material hopper of the injection machine, is fed into a plunger chamber of the injection machine by a metering screw at a certain amount, the resinous material fed into the plunger chamber is injected toward the die by the plunger at a certain pressure, and the injected resinous material is extruded through the nozzle of the die.

The present invention also provides a method for preparing a panel with a resinous frame, wherein while relatively moving a die for extruding a resinous material and a peripheral edge of a panel, a resinous material is extruded through a nozzle provided in the die and having

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a certain cross-sectional shape, and the extruded resinous material is formed on the peripheral edge of the panel so as to have a certain cross-sectional shape substantially conforming to the cross-sectional shape of the nozzle, characterized in that an injection machine is provided on an upstream side of the die, and a resinous material, which is supplied through a resinous material hopper of the injection machine, is fed into a plunger chamber of the injection machine by a metering screw at a certain amount, and that while controlling an injection amount of the resinous material in response to a relative moving speed between a peripheral edge of the panel and the die, the resinous material fed into the plunger chamber is injected toward the die by a plunger to be extruded onto the peripheral edge of the panel through the nozzle of the die.

The present invention also provides a method for preparing a panel with a resinous frame unified to a peripheral edge thereof, wherein a resinous material is extruded from a die with a nozzle having a certain cross-sectional shape to be formed so as to have a certain cross-sectional shape substantially conforming to the cross-sectional shape of the nozzle, the extruded and formed resinous material is drawn into a pressing member, and wherein while relatively moving a panel and the pressing member so that the pressing member moves along a peripheral edge of the panel, the extruded and formed

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resinous material is unified to the peripheral edge by the pressing member, characterized in that an injection machine is provided on an upstream side of the die, and a resinous material, which is supplied through a resinous material hopper of the injection machine, is fed into a plunger chamber of the injection machine by a metering screw at a certain amount, and that while controlling an injection amount of the resinous material in response to a relative moving speed between a peripheral edge of the panel and the die, the resinous material fed into the plunger chamber is injected toward the die by a plunger to be extruded onto the peripheral edge of the panel through the nozzle of the die.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a cross-sectional view showing an example of a system to practice the forming method according to the present invention; Figure 2 is a cross-sectional view showing another example of the system to practice the forming method according to the present invention; Figure 3 is a graphical representation showing relationships among a moving speed of a glass sheet (A), an output pressure from a nozzle (B), an output amount from the nozzle per unit time (C) and a discharge amount outside the system (D) in a forming method according to the present invention; Figure 4 is a perspective view explaining how a conventional extruder is employed to form a resinous bead on a glass sheet; Figure 5 is a plan

view showing an example of the formation of the resinous bead on a glass sheet; Figure 6 is a plan view showing another example of the formation of the resinous bead on a glass sheet; Figure 7 is a cross-section view showing an example of a conventional extruder; Figure 8 is a graphical representation showing relationships among a moving speed of a glass sheet (A), an output pressure from an extruder (B), an output amount from the extruder per unit time (C) and a discharge amount outside the system (D) in the conventional extruder; Figure 9 is a graphical representation showing relationships among a moving speed of a glass sheet (A), an output pressure from an extruder (B), an output amount from the extruder per unit time (C) and a discharge amount outside the system (D) in the conventional extruder under another control; Figure 10 is a graphical representation showing relationships among a moving speed of a glass sheet (A), an output pressure from a nozzle (B), an output amount from the nozzle per unit time (C) and a discharge amount outside the system (D) in another forming method according to the present invention: and Figure 11 is an overall perspective view explaining how to unify a resinous molding on a glass sheet.

BEST MODE FOR CARRYING OUT THE INVENTION

Now, preferred embodiments of the method for forming a resinous frame and the method for preparing a panel with a resinous frame according to the present invention

will be described, referring to the accompanying drawings.

In Figure 1 is shown a cross-sectional view of an example of an injection machine, which is employed in the methods according to the present invention. The injection machine 14 includes a measuring screw 9 in a main body 10, which is rotated by a drive 8. A resinous material 5 is supplied through a resinous material hopper 11, which is provided on an upper portion of a right end of the main body 10. After supply, the resinous material 5 is heated and softened by heaters 12 provided in the main body 10. The measuring screw 9 feeds the heated and softened resinous material 5 to a plunger chamber 16 in the main body 9 through a conduit 15 at a left end of the main body. The plunger chamber 16 has a plunger 17 inserted therein. When the plunger 17 is moved in the right direction by an external hydraulic cylinder 18, the resinous material 5 is sucked into the plunger chamber 16 through the conduit 15. When the plunger 17 is moved in the left direction indicated by an arrow, the resinous material 5 is injected toward a die 6.

In this Figure, reference numeral 19 designates a controller, which controls a moving device, and which controls a control valve 20 for the hydraulic cylinder 18 of the plunger 17 so as to mate with the movement of a glass sheet by the moving device. The moving device and the movement of a glass sheet by the moving device with

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respect to the die may be similar to those shown in Figure 4. In this embodiment, the extruder 4 shown in Figure 4 is replaced by the injection machine 14. The drive for the plunger 17 may be an AC servomotor or a similar device in place of the hydraulic cylinder 18.

The process wherein the injection machine 14 of Figure 1 is employed to form a bead 5′ on sides 1a and corners 1b of a glass sheet (Figure 5) will be explained. The measuring screw 9 is rotated at a certain speed. The resinous material 5 on the measuring screw 9 is sucked, through the conduit 15, into the plunger chamber 16 by moving the plunger 17 in the right direction. The suction by the plunger 17 is carried out when the glass sheet is mounted on and dismounted from the moving device (a handling process shown in Figure 3 (A)).

When the plunger 17 is moved in the direction indicated by the arrow, the resinous material 5 is injected into the die 6, and the resinous material is delivered on the glass sheet through a nozzle 7, having a certain cross-sectional shape. When the periphery of the glass sheet is moved along the nozzle 7 while advancing the plunger 17, the resinous material 5 is formed on the periphery of the glass sheet as a bead unified to the periphery, having the certain cross-sectional shape.

When the glass sheet is continuously moved, a corner of the glass sheet arrives at the nozzle 7. On arrival, the positional shift of the glass sheet is halted to

prevent the position of the glass sheet with respect to the nozzle from changing. Then, the glass sheet is rotated about the nozzle 7. If the output amount of the resinous material from the nozzle per unit time is changed, the supply of the resinous material becomes excessive since the glass sheet is halted. From this viewpoint, the advance of the plunger 7 is halted to prevent the resinous material 5 from being supplied to the die 6. Thus, the output of the resinous material can be carried out so as to match with the positional state of the glass sheet since the advance of the plunger 17 can be instantaneously stopped as in the movement of the glass sheet.

When the formation of the bead on the corner of the glass sheet is completed, a rapid movement of the glass sheet starts to form the bead on a side of the glass sheet. The advance of the plunger in the direction indicated by the arrow restarts in response to the start of the rapid movement. In this case, the output of the resinous material can be carried out so as to match with the positional state of the glass sheet since the advance of the plunger 17 can instantaneously start as in the movement of the glass sheet.

In Figure 3 is shown a graphical representation of relationships among a moving speed of the glass sheet (A), an output pressure form the nozzle (B), an output amount from the nozzle per unit time (C) and a discharge

amount outside the system (D) in a case wherein the glass sheet 1 has rectangular corners 1b formed with the bead 5′ by the injection machine 14. When the plunger 17 is operated to change the output pressure from the nozzle as shown in Figure 3 (B) so as to match with the movement of the glass sheet shown in Figure 3 (A), the output amount from the nozzle per unit time is controlled as shown in Figure 3 (C). When the plunger 17 is activated to provide the die 6 with the resinous material 5 in a amount necessary and sufficient to form the bead 5′ on the glass sheet 1, the process can be carried out without discharging the resinous material outside the system (Figure 3 (D)).

In the injection machine 14 of Figure 1, the pressure of the resinous material 5 in the plunger chamber 16 gradually reduces when the plunger 17 is switched from an injected state to the halt of injection or a decrease in the injection amount (Figure 3 (B) "c"). As a result, the output amount from the nozzle 7 becomes excess due to the presence of the residual pressure in the plunger chamber 16 (Figure 3 (C) "c′"). When the injection starts from the halt of injection, there is a time lag, which is required to increase the pressure of the resinous material 5 in the vicinity of the nozzle 7. By the time lag, the output pressure from the nozzle gently increases as indicated by reference "d" in Figure 3 (B), and consequently the output amount from the nozzle

gently increases as indicated by reference d' in Figure 3 (C).

In order to cope with this problem, it is proposed that the plunger 17 be slightly withdrawn in the direction opposite to the injection direction to decrease the residual pressure in the plunger chamber 16 when switching from the injected state to the halt of injection or a small amount of injection. Or, it is proposed that the plunger 17 be moved at a speed higher than the certain speed to shorten the time required for raising the pressure of the resinous material 5 when starting the injection after the halted state. By either one of the measures, the output pressure from the nozzle can be controlled as indicated by dotted lines "e" in Figure 3 (B) to avoid the occurrence of the excess output of the resinous material from the nozzle 7, enabling to resume the injection promptly (dotted lines "e'" in Figure 3 (C)).

In Figure 2 is shown a cross-sectional view of another example of the injection machine applicable to the methods according to the present invention. There is provided a resin flow controller 21, such as a switching valve and a gear pump, between the nozzle 7 of the die 6 and the plunger 17 (in the die 6 in the example shown in Figure 2). The controller 19 also controls the resin flow controller 21 so as to match the resin flow controller with the movement of a glass sheet by the

moving device as well as controls the control valve 20 for the hydraulic cylinder 18 of the plunger 17.

In the injection machine 14 shown in Figure 2, the movement of the plunger 17 and the resin flow controller 21 are interrelatedly controlled so as to match with the movement of the glass sheet. In this case, the resin pressure in a communication conduit 22 between the injection machine 14 and the resin flow controller 21 is held substantially constant. When the movement of the plunger 17 is halted or decelerated, the resin pressure in the plunger chamber 16 gradually reduces as stated earlier. By using the resin flow controller 21 to decrease the size of the conduit leading to the nozzle 7 when halting or decelerating the movement of the plunger, the resin pressure in the communication conduit 22 can not be prevented from reducing even if the amount of the resin material to be injected becomes small. By balancing the flow of the resinous material 5 to be injected and the opening degree of the resin flow controller 21, the resin pressure in the communication conduit 22 can be held substantially constant (When the flow of the resinous material 5 to be injected is decreased, the opening degree of the communication conduit is decreased by the resin flow controller 21).

This process is shown in Figure 10 (E). The glass sheet, which has been rapidly moved, is halted (Figure 10 (A)). If the resin flow controller 21 is not activated

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(a solid line in Figure 10 (E)), the output pressure from the nozzle 7 gradually reduces (reference "c" in Figure 10 (B)) since the resin pressure is residual in the die 6 even after having halted the plunger 17. The gradual reduction in the output pressure causes the output amount from the nozzle 7 per unit time to gradually reduce (reference "c'" in Figure 10 (C)).

Conversely, when the resin flow controller 21 is activated, the excess output of the resin material can be restrained (reference "e'" in Figure 10 (C)) since a shutdown is formed between the nozzle 7 and the die 6 where the resin pressure is residual. When the formation of the bead on a side of the glass sheet restarts after having completed the formation of the bead on the preceding corner of the glass sheet, the resin pressure in the communication conduit is held constant (dotted lines in Figure 10 (E)). As a result, when the plunger 17 is advanced in the direction indicated by the arrow, the resin material can be promptly delivered from the nozzle (reference "e'" in Figure 10 (C)) since the resin pressure has been held at a level sufficient to inject the certain flow.

In the examples stated earlier, the resin material, which is fed to the die from the injection machine, is directly formed on the periphery of the glass sheet. The method for forming a resin frame according to the present invention can also be applied to press a formed resin

frame on the periphery of a glass sheet just after having extruded the resin material in a certain cross-sectional shape. An example of the resin frame formed by the pressing method is one called a molding, which is interposed between a glass plate for automobile windows and a window opening of a vehicle body. The reason why the method according to the present invention is appropriate to the foundation of the molding is as follows:

When such a molding is provided on an exterior side of an automobile, the molding is required to have not only dimensional accuracy but also good appearance. When the resinous frame is formed directly on the periphery of a glass sheet, the vibration of the injection machine can have an adverse effect on a surface of the molding, degrading the appearance thereof. From this viewpoint, the method for pressing a formed resin frame on the periphery of a glass sheet is effective as a method for unifying a resin frame to a glass plate for automobile windows.

When the molding is unified to the corners of a glass plate for automobile windows, the moving speed of the glass plate is reduced as in the embodiments as stated earlier. If the extruder is employed to extrude a resinous material without taking any measures, the excess output of the resinous material occurs as stated earlier. The molding is required to have high dimensional accuracy

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since it is unified to the periphery of a glass plate and mounted to a window opening of a vehicle body. The presence of an error in the cross-sectional shape of a molding, which is caused by even slight excess output, has a great advance effect on accuracy of assembling a glass plate for automobile windows to a vehicle body.

The corners of a glass plate for automobile windows are usually rounded to some extent. The radius of curvature of the corners ranges from about 80 mmR or more at the maximum to a few mmR at the minimum. If the radius of curvature is about 50 mmR, a molding can be unified to the corners of the glass plate by extruding a resinous material while relatively moving the glass plate and the die for extruding a resinous material. However, if the glass plate has corners of a radius of curvature of 50 mmR or less, or about a few mmR in extreme case, the shape of the molding fails to be stable on the following reasons. As stated earlier, the relative moving speed between the glass plate and the die (the pressing member in this example) is accelerated and decelerated in the vicinity of a corner. In case of a normal extruder, the control of the output amount of a resinous material fails to follow the acceleration and deceleration as in case of a rectangular corner. Under the circumstances, when the relative moving speed decelerates, the resinous material is excessively delivered in comparison with the decelerated relative

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moving speed, and when the relative moving speed increases, the output amount of the resinous material fails to increase in comparison with the accelerated relative moving speed. As a result, the formed molding can not have a desired cross-sectional shape, degrading the assembling accuracy. In order to prevent the assembling accuracy from degrading, an additional step has been required to unify the molding to the corners (disclosed in, e.g., USP 5,316,829 and USP 5,456,874). The application of the method for forming a resinous frame according to the present invention to the unification of a molding to a glass plate for automobile windows, in particular the application of the method to the unification of a molding to a glass plate having corners formed in a radius of curvature of 50 mmR or less, is effective since there is no need for an additional step.

A method for pressing a formed resinous frame on the periphery of a glass plate for automobile windows just after having extruded a resinous material so as to have a certain cross-sectional shape has been disclosed in USP 5,795,421. The summary of this method will be explained, referring to Figure 11. A resinous frame forming system 50 has the injection machine shown in Figure 1 or 2 incorporated thereinto. The resinous frame forming system 50 has a leading edge provided with a die 56 having a nozzle. A resinous material 55, which has been

delivered in a certain cross-sectional shape from the die 56, is drawn into a pressing member 59, which is fixed at a location apart from the die by a certain distance. The pressing member 59 has a hollow portion formed therein so as to substantially conform to the cross-sectional shape of the formed resinous material 55. The formed resinous material 55 and a glass plate 51 are inserted together into the hollow portion. Thus, the formed resinous material 55 is pressed onto the periphery of the glass plate 51 to be unified to the periphery of the glass plate 51 as a molding 55'. In this method, the glass plate 51 is supported by a moving device 53, and the periphery of the glass plate 51 is moved along the pressing member 59 under the action of the moving device 53.

The resinous frame forming system 50 has the injection machine shown in Figure 1 or 2 incorporated thereinto. The operation for unifying a molding to a glass plate for automobile windows by using the injection machine will be explained. When the molding 55' is unified to sides of the glass plate 51, the glass plate 51 is rapidly moved, having a corresponding side thereof moved along the pressing member 59. In this case, the advance of the plunger injects the resinous material into the die 56, and the resinous material is delivered from the nozzle.

When a corner of the glass plate 51 approaches the

pressing member 59, the movement of the glass plate 51 is decelerated. The movement of the plunger is also decelerated so as to match with the decelerated movement of the glass pane. Thus, the resinous material to be fed to the die 56 is reduced to decrease the output amount of the resinous material to be delivered from the nozzle. Suppose that the output amount per unit time for unifying a molding to a corner of the glass plate is the same as that for unifying the molding to a side of the glass plate, the resinous material is excessively delivered into between the pressing member 59 and the die 6. When the molding is unified to a corner while the glass plate 51 is rotating about the pressing member 59, the output amount of the resinous material per unit time, which is delivered to the glass plate, is reduced in order to cope with this problem.

When the unification of the molding to a corner is completed, the unification of the molding to the succeeding side starts. In order to match with an increase in the moving speed of the glass plate during forming the molding to the side, the output amount of the resinous material per unit time, which is delivered from the nozzle, is increased. In this case, the plunger can be rapidly advanced to extrude the resinous material, injecting the resinous material toward the die 6 with good response.

The variation in the resin pressure in the

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communication conduit, which is caused by the movement of the plunger, can be restrained by the resin flow controller as stated earlier (see Figure 2).

The present invention is not limited to the embodiments stated earlier. An example of a panel to have the resinous frame unified thereto is a transparent synthetic resin panel in addition to a glass sheet, for instance. Examples of the glass sheet include a single glass sheet, laminated glass with plural glass sheets laminated through synthetic resin intermediate films, insulating glass with plural glass sheets and air layers alternately provided, and so on. The panel can have various shapes, depending on applications of the panel. As illustrated, the corners may have a rectangular shape, a round shape or an unrectangular but angular shape. The panel may be a flat plate or a curved plate.

The formed resinous frame includes one generally called a bead or a glazing channel for building windows, and one called a molding or a gasket for automobile glass plates. The molding includes one unified to the entire periphery of a glass sheet, and one unified to a single side of a glass sheet or a side including plural corners of a glass sheet. The shape of a molding includes one unified to an interior side surface, end surfaces and an exterior side surface of a glass sheet, one unified to either one of the interior side surface and the interior side surface, and one unified to the end surfaces and

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either one of the interior side surface and the interior side surface.

The forming method for a molding includes a method carrying out the unification by performing the pressing just after having completed the extrusion, and a method for unifying a resinous material delivered from the nozzle directly to a glass sheet. In particular, the method according to the present invention preferably applies to a molding that is not extensively exposed on an exterior side of a vehicle and that is formed so as to be unified on an interior side of the vehicle.

The relative movement between a glass sheet and the die or the pressing member may be carried out by moving the die or the pressing member or moving the glass sheet, or by moving both facing members alternately or simultaneously.

INDUSTRIAL APPLICABILITY

As explained, the present invention can employ the injection machine to extrude a resinous frame, significantly decreasing the discharge of the resinous material outside the system. In particular, the unification of a resinous frame to a corner, which has been difficult to carry out, becomes possible when a glass sheet and the die (or the pressing member) are relatively moved to unify the resin frame to the periphery of the glass sheet while extruding the resinous material from the die. In this case, a unified portion

of the resinous frame is subjected to different relative moving speeds at a side of a glass sheet and at a corner of the glass sheet. Even if the output amount of the resinous material per unit time is abruptly changed so as to match with a change in the relative moving speed, the resinous frame can be integrally formed so as to continuously have a certain cross-sectional shape on both sides and corners.

DESCPAMD

CLAIMS

1. A method for forming a resinous frame wherein a resinous material is extruded from a die with a nozzle having a certain cross-sectional shape to be formed so as to have a certain cross-sectional shape substantially conforming to the cross-sectional shape of the nozzle, characterized in that an injection machine having a plunger is provided upstream of the die, the injection machine injects the resinous material toward the die, and the resinous material is extruded through the die.

2. A method for forming a resinous frame wherein a resinous material is extruded from a die with a nozzle having a certain cross-sectional shape to be formed so as to have a certain cross-sectional shape substantially conforming to the cross-sectional shape of the nozzle, characterized in that an injection machine is provided on an upstream side of the die, a resinous material, which is supplied through a resinous material hopper of the injection machine, is fed into a plunger chamber of the injection machine by a metering screw at a certain amount, the resinous material fed into the plunger chamber is injected toward the die by the plunger at a certain pressure, and the resinous material is extruded through the nozzle of the die.

3. The method for forming a resinous material according to Claim 1 or 2, characterized in that a resinous material flow controller is provided between the

injection machine and the nozzle, and the resinous material flow controller is employed to control an injection amount of the resinous material per unit time.

4. A method for preparing a panel with a resinous frame, wherein while relatively moving a die for extruding a resinous material and a peripheral edge of a panel, a resinous material is extruded through a nozzle provided in the die and having a certain cross-sectional shape, and the extruded resinous material is formed on the peripheral edge of the panel so as to have a certain cross-sectional shape substantially conforming to the cross-sectional shape of the nozzle, characterized in that an injection machine is provided on an upstream side of the die, and a resinous material, which is supplied through a resinous material hopper of the injection machine, is fed into a plunger chamber of the injection machine by a metering screw at a certain amount, and that while controlling an injection amount of the resinous material in response to a relative moving speed between a peripheral edge of the panel and the die, the resinous material fed into the plunger chamber is injected toward the die by a plunger to be extruded onto the peripheral edge of the panel through the nozzle of the die.

5. The method for preparing a panel with a resinous frame according to Claim 4, characterized in that a resinous material flow controller is provided between the injection machine and the nozzle, and the resinous

material flow controller is employed to restrain an excess discharge in response to the relative moving speed between the panel and the die.

6. The method for preparing a panel with a resinous frame according to Claim 4 or 5, characterized in that when a portion of the panel facing the die transfers from a side of the panel onto a corner of the panel, the relative moving speed between the panel and the die is reduced, a moving speed of the plunger is reduced in response to the reduction in the relative moving speed to decrease an output amount from the nozzle per unit time, and that when the portion of the panel facing the die transfers from the corner of the panel onto another side of the panel, the relative moving speed between the panel and the die is raised, the moving speed of the plunger is raised in response to the raise in the relative moving speed to increase the output amount from the nozzle per unit time.

7. A method for preparing a panel with a resinous frame unified to a peripheral edge thereof, wherein a resinous material is extruded from a die with a nozzle having a certain cross-sectional shape to be formed so as to have a certain cross-sectional shape substantially conforming to the cross-sectional shape of the nozzle, the extruded and formed resinous material is drawn into a pressing member, and wherein while relatively moving a panel and the pressing member so that the pressing member moves

along a peripheral edge of the panel, the extruded and formed resinous material is unified to the peripheral edge by the pressing member, characterized in that an injection machine is provided on an upstream side of the die, and a resinous material, which is supplied through a resinous material hopper of the injection machine, is fed into a plunger chamber of the injection machine by a metering screw at a certain amount, that while controlling an injection amount of the resinous material in response to a relative moving speed between a peripheral edge of the panel and the die, the resinous material fed into the plunger chamber is injected toward the die by a plunger to be extruded onto the peripheral edge of the panel through the nozzle of the die.

8. The method for preparing a panel with a resinous frame according to Claim 7, characterized in that a resinous material flow controller is provided between the injection machine and the nozzle, and the resinous material flow controller is employed to restrain an excess discharge in response to the relative moving speed between the panel and the pressing member.

9. The method for preparing a panel with a resinous frame according to Claim 7 or 8, characterized in that when a portion of the panel facing the pressing member transfers from a side of the panel onto a corner of the panel, the relative moving speed between the panel and the pressing member is reduced, a moving speed of the

plunger is reduced in response to the reduction in the relative moving speed to decrease an output amount from the nozzle per unit time, and that when the portion of the panel facing the pressing member transfers from the corner of the panel onto another side of the panel, the relative moving speed between the panel and the pressing member is raised, the moving speed of the plunger is raised in response to the raise in the relative moving speed to increase the output amount from the nozzle per unit time.

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CLAIMS

-- 10. A method for forming a resinous frame wherein a resinous material is extruded from a die with a nozzle having a certain cross-sectional shape to be formed so as to have a certain cross-sectional shape substantially conforming to the cross-sectional shape of the nozzle, characterized in that an injection machine having a plunger is provided upstream of the die, the injection machine injects the resinous material toward the die, and the resinous material is extruded through the die.

11. A method for forming a resinous frame wherein a resinous material is extruded from a die with a nozzle having a certain cross-sectional shape to be formed so as to have a certain cross-sectional shape substantially conforming to the cross-sectional shape of the nozzle, characterized in that an injection machine is provided on an upstream side of the die, a resinous material, which is supplied through a resinous material hopper of the injection machine, is fed into a plunger chamber of the injection machine by a metering screw at a certain amount, the resinous material fed into the plunger chamber is injected toward the die by the plunger at a certain pressure, and the resinous material is extruded through the nozzle of the die.

12. The method for forming a resinous material according to Claim 10, characterized in that a resinous material flow controller is provided between the injection machine

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and the nozzle, and the resinous material flow controller is employed to control an injection amount of the resinous material per unit time.

13. The method for forming a resinous material according to Claim 11, characterized in that a resinous material flow controller is provided between the injection machine and the nozzle, and the resinous material flow controller is employed to control an injection amount of the resinous material per unit time.

14. A method for preparing a panel with a resinous frame, wherein while relatively moving a die for extruding a resinous material and a peripheral edge of a panel, a resinous material is extruded through a nozzle provided in the die and having a certain cross-sectional shape, and the extruded resinous material is formed on the peripheral edge of the panel so as to have a certain cross-sectional shape substantially conforming to the cross-sectional shape of the nozzle, characterized in that an injection machine is provided on an upstream side of the die, and a resinous material, which is supplied through a resinous material hopper of the injection machine, is fed into a plunger chamber of the injection machine by a metering screw at a certain amount, and that while controlling an injection amount of the resinous material in response to a relative moving speed between a peripheral edge of the panel and the die, the resinous material fed into the plunger chamber is injected toward

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the die by a plunger to be extruded onto the peripheral edge of the panel through the nozzle of the die.

15. The method for preparing a panel with a resinous frame according to Claim 14, characterized in that a resinous material flow controller is provided between the injection machine and the nozzle, and the resinous material flow controller is employed to restrain an excess discharge in response to the relative moving speed between the panel and the die.

16. The method for preparing a panel with a resinous frame according to Claim 14, characterized in that when a portion of the panel facing the die transfers from a side of the panel onto a corner of the panel, the relative moving speed between the panel and the die is reduced, a moving speed of the plunger is reduced in response to the reduction in the relative moving speed to decrease an output amount from the nozzle per unit time, and that when the portion of the panel facing the die transfers from the corner of the panel onto another side of the panel, the relative moving speed between the panel and the die is raised, the moving speed of the plunger is raised in response to the raise in the relative moving speed to increase the output amount from the nozzle per unit time.

17. The method for preparing a panel with a resinous frame according to Claim 15, characterized in that when a portion of the panel facing the die transfers from a side

of the panel onto a corner of the panel, the relative moving speed between the panel and the die is reduced, a moving speed of the plunger is reduced in response to the reduction in the relative moving speed to decrease an output amount from the nozzle per unit time, and that when the portion of the panel facing the die transfers from the corner of the panel onto another side of the panel, the relative moving speed between the panel and the die is raised, the moving speed of the plunger is raised in response to the raise in the relative moving speed to increase the output amount from the nozzle per unit time.

18. A method for preparing a panel with a resinous frame unified to a peripheral edge thereof, wherein a resinous material is extruded from a die with a nozzle having a certain cross-sectional shape to be formed so as to have a certain cross-sectional shape substantially conforming to the cross-sectional shape of the nozzle, the extruded and formed resinous material is drawn into a pressing member, and wherein while relatively moving a panel and the pressing member so that the pressing member moves along a peripheral edge of the panel, the extruded and formed resinous material is unified to the peripheral edge by the pressing member, characterized in that an injection machine is provided on an upstream side of the die, and a resinous material, which is supplied through a resinous material hopper of the injection machine, is fed

into a plunger chamber of the injection machine by a metering screw at a certain amount, that while controlling an injection amount of the resinous material in response to a relative moving speed between a peripheral edge of the panel and the die, the resinous material fed into the plunger chamber is injected toward the die by a plunger to be extruded onto the peripheral edge of the panel through the nozzle of the die.

19. The method for preparing a panel with a resinous frame according to Claim 18, characterized in that a resinous material flow controller is provided between the injection machine and the nozzle, and the resinous material flow controller is employed to restrain an excess discharge in response to the relative moving speed between the panel and the pressing member.

20. The method for preparing a panel with a resinous frame according to Claim 18, characterized in that when a portion of the panel facing the pressing member transfers from a side of the panel onto a corner of the panel, the relative moving speed between the panel and the pressing member is reduced, a moving speed of the plunger is reduced in response to the reduction in the relative moving speed to decrease an output amount from the nozzle per unit time, and that when the portion of the panel facing the pressing member transfers from the corner of the panel onto another side of the panel, the relative moving speed between the panel and the pressing member is

raised, the moving speed of the plunger is raised in response to the raise in the relative moving speed to increase the output amount from the nozzle per unit time.

21. The method for preparing a panel with a resinous frame according to Claim 19 , characterized in that when a portion of the panel facing the pressing member transfers from a side of the panel onto a corner of the panel, the relative moving speed between the panel and the pressing member is reduced, a moving speed of the plunger is reduced in response to the reduction in the relative moving speed to decrease an output amount from the nozzle per unit time, and that when the portion of the panel facing the pressing member transfers from the corner of the panel onto another side of the panel, the relative moving speed between the panel and the pressing member is raised, the moving speed of the plunger is raised in response to the raise in the relative moving speed to increase the output amount from the nozzle per unit time.

ABSTRACT

An injection machine, which is provided upstream of a die and has a plunger, is employed to inject a resinous material into the die, and the injected resinous material is extruded in a certain shape through a nozzle of the die. Thus, the extruded resinous material can be provided with a desired cross-sectional shape even when an injection amount of the resinous material is changed.

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Fig. 1

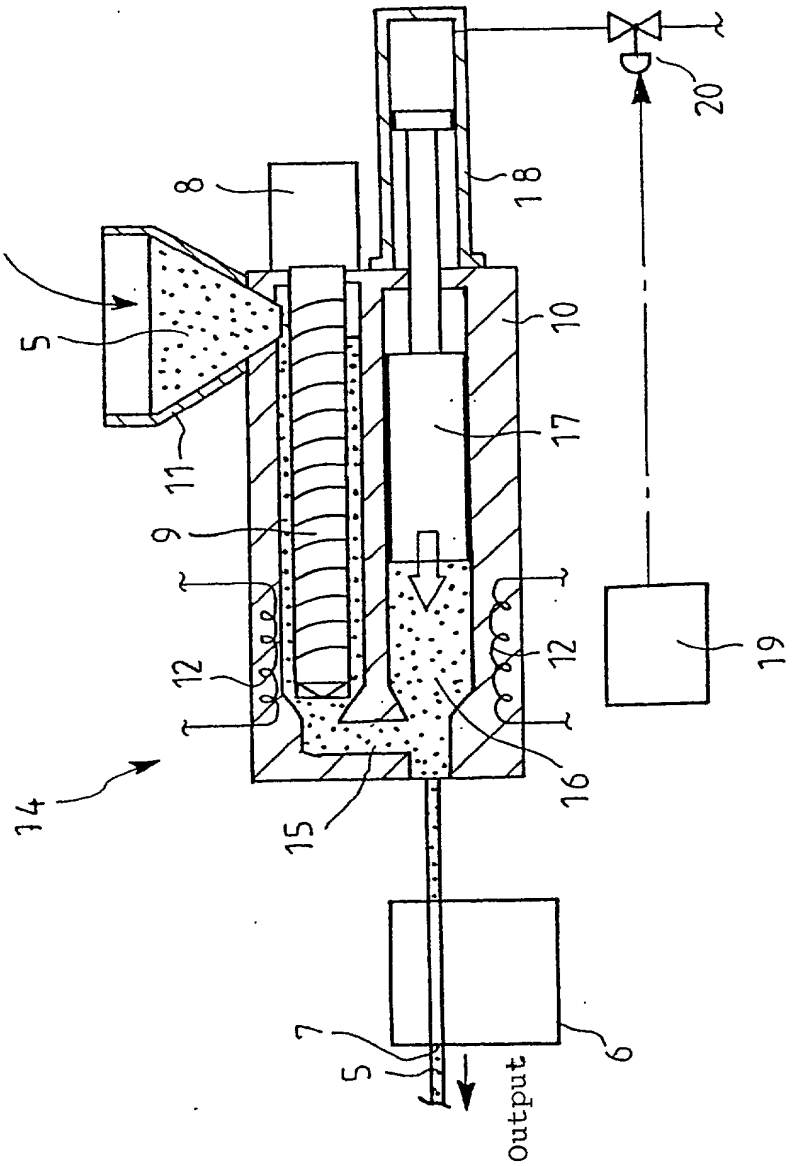

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Fig. 2

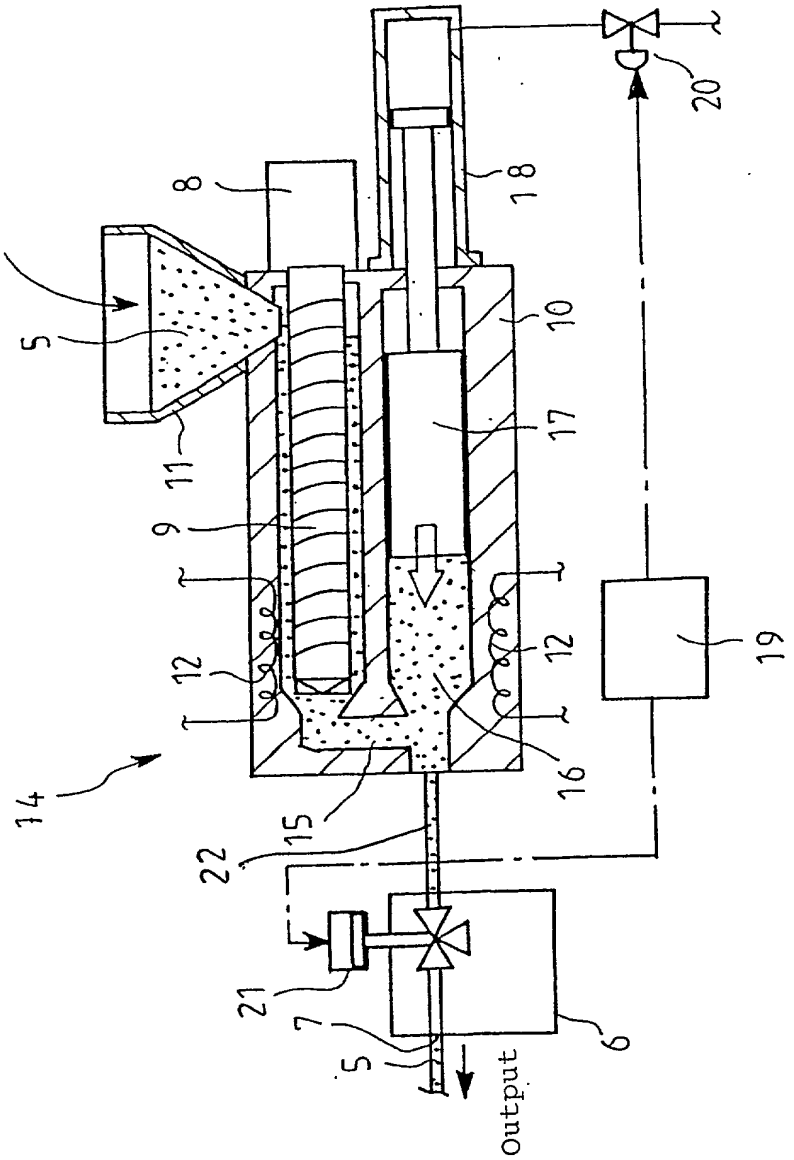

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Fig. 3

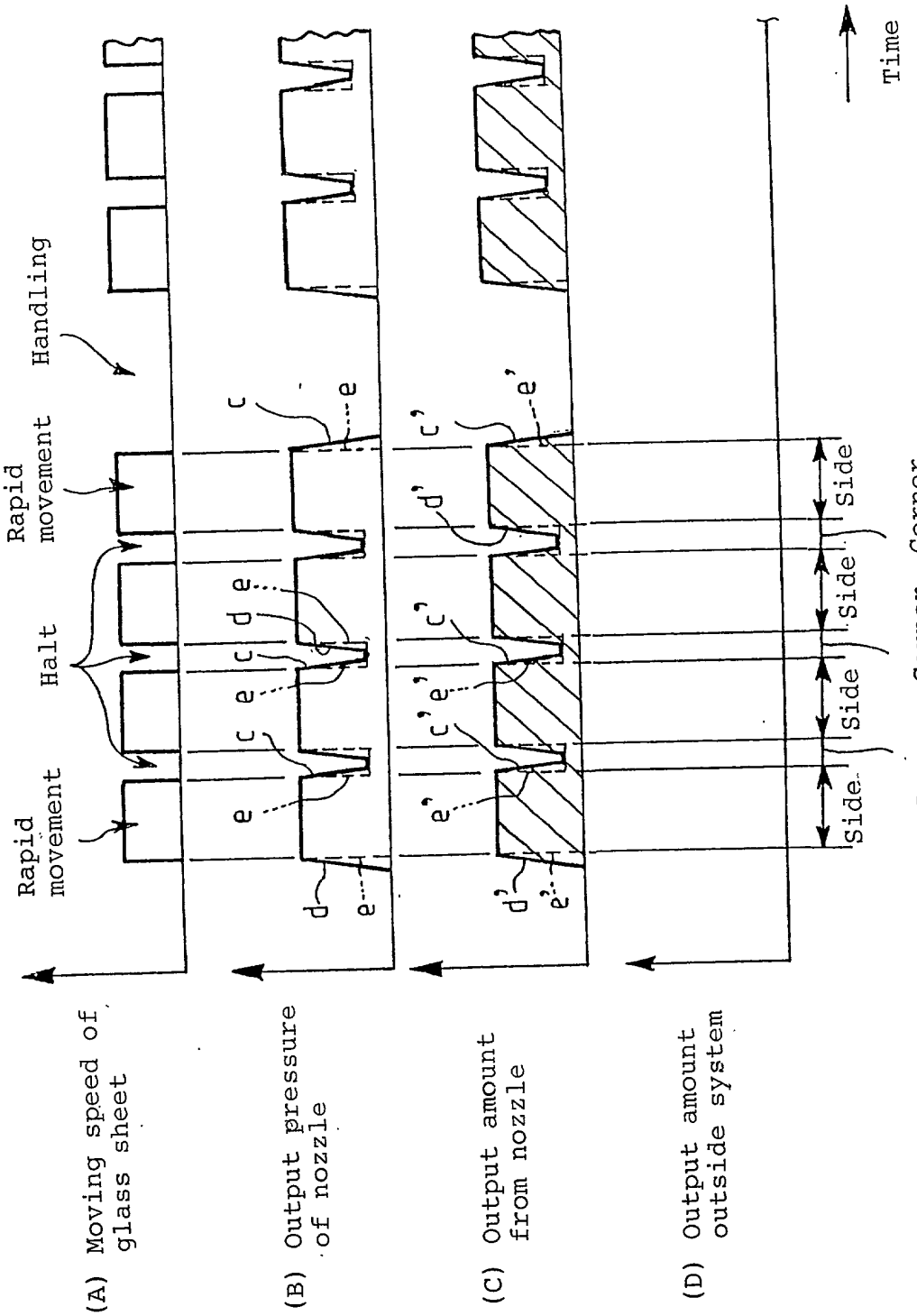
(A) Moving speed of glass sheet
(B) Output pressure of nozzle
(C) Output amount from nozzle
(D) Output amount outside system
Rapid movement
Halt
Rapid movement
Handling
Time
Corner
Side
Corner
Side
Corner
Side
Corner
Side
c
e
d
e
c
e
c
e
d
e
c'
e'
d'
e'
c'
e'
c'
e'
d'
e'

Fig. 4

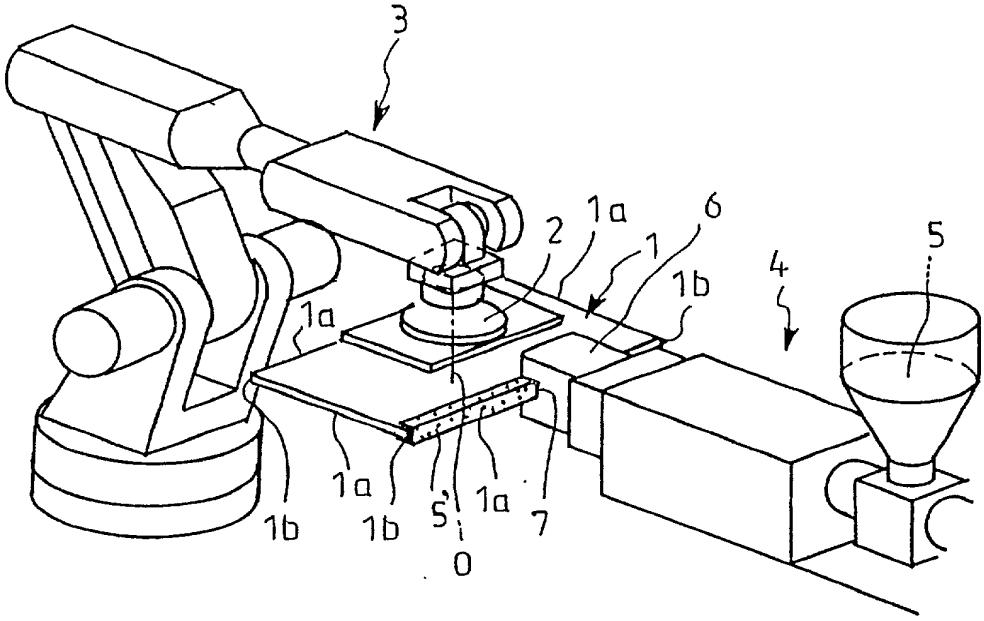

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Fig. 5

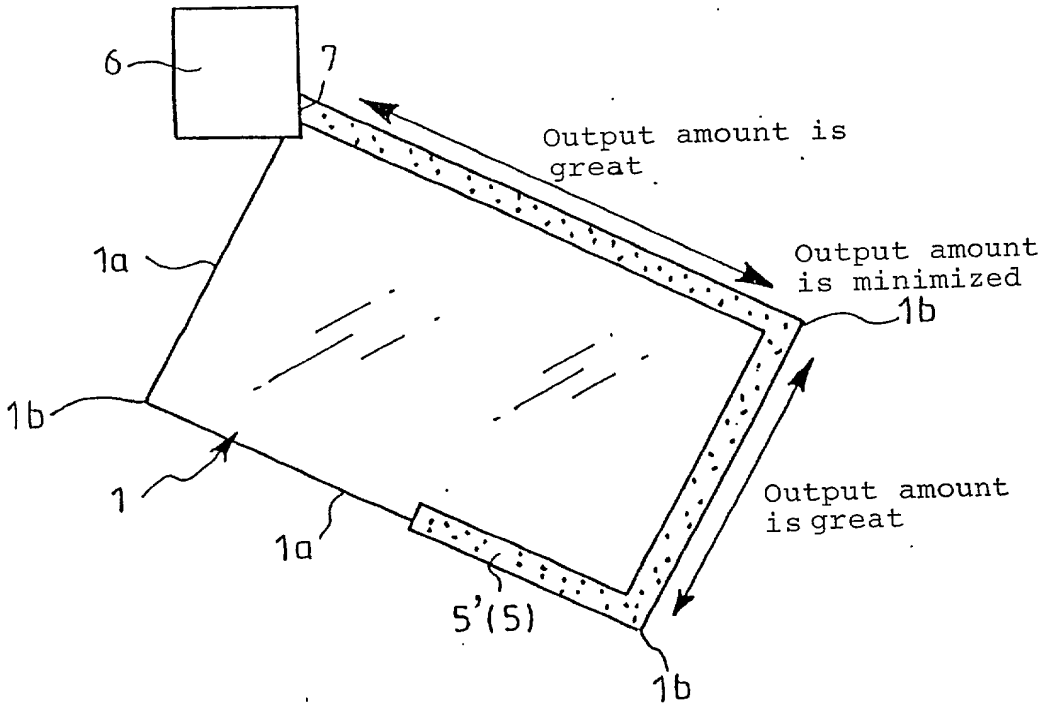

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Fig. 6

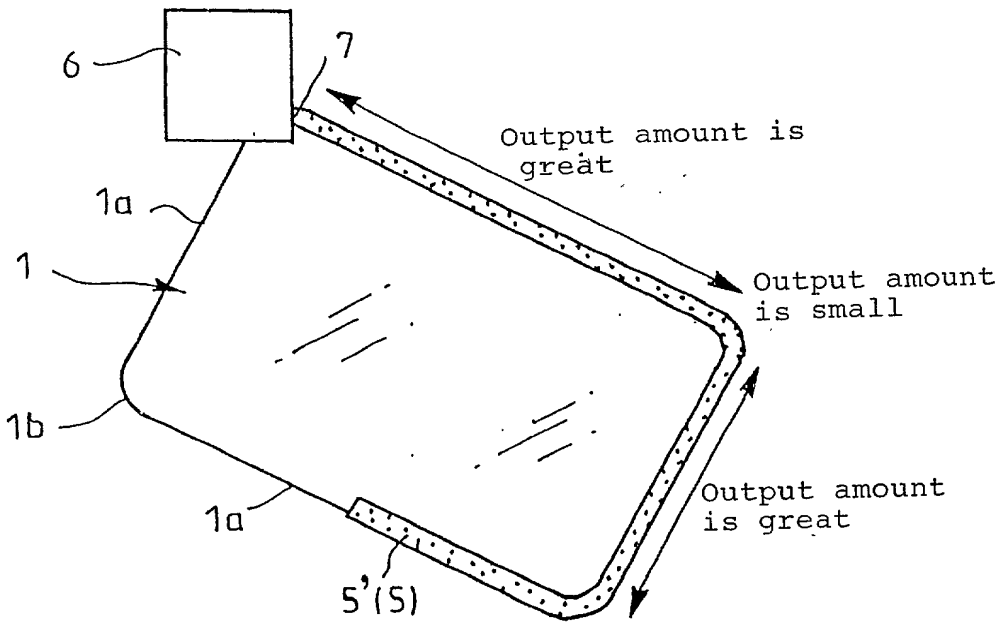

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Fig. 7

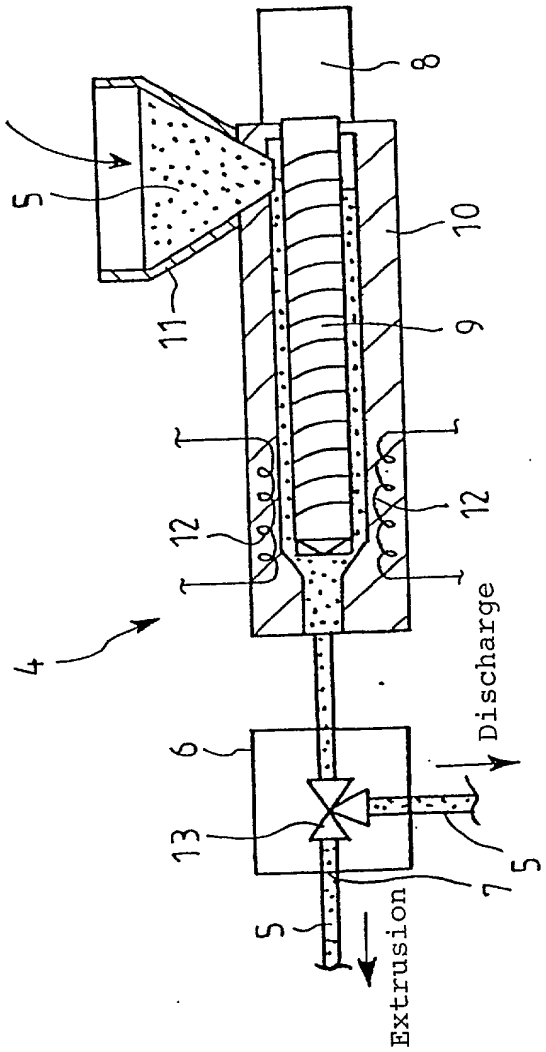

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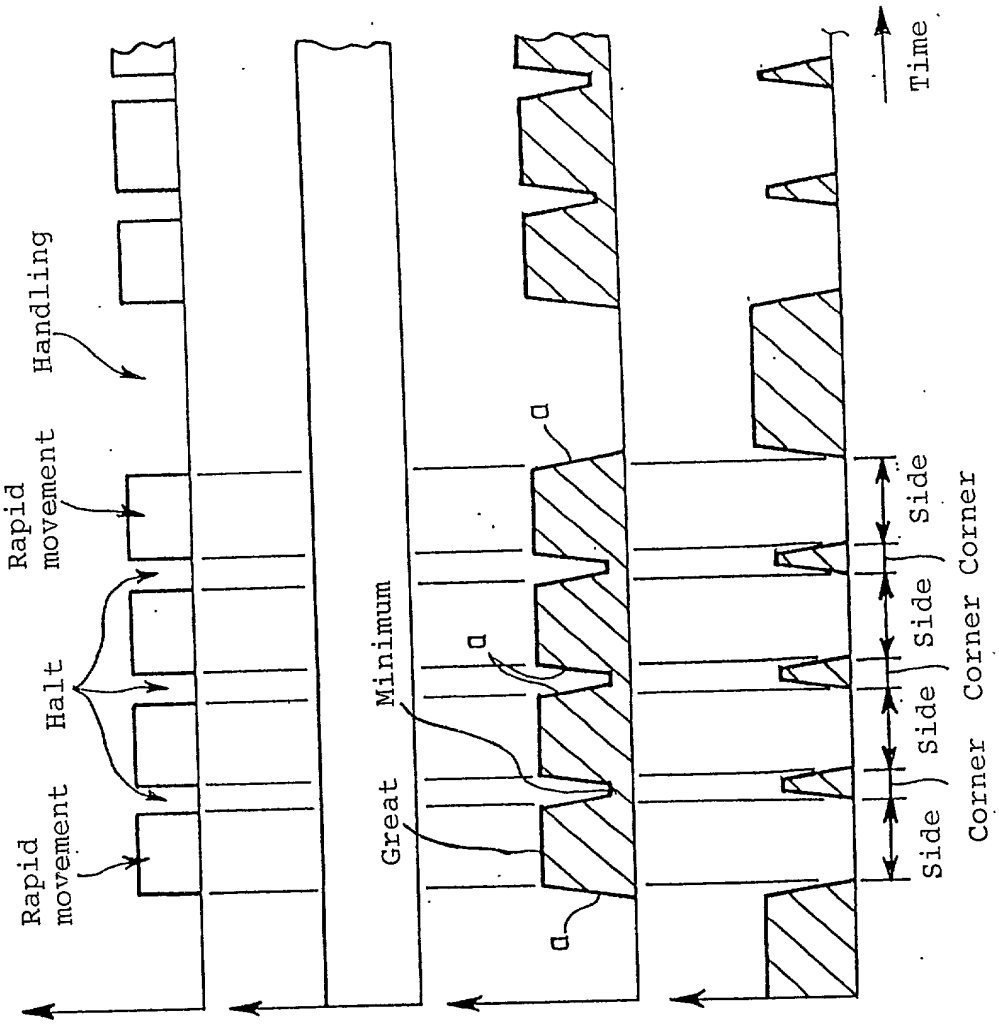
Fig. 8



(A) Moving speed of glass sheet

(B) Output pressure of extruder

(C) Output amount of extruder

(D) Output amount outside system

Fig. 9

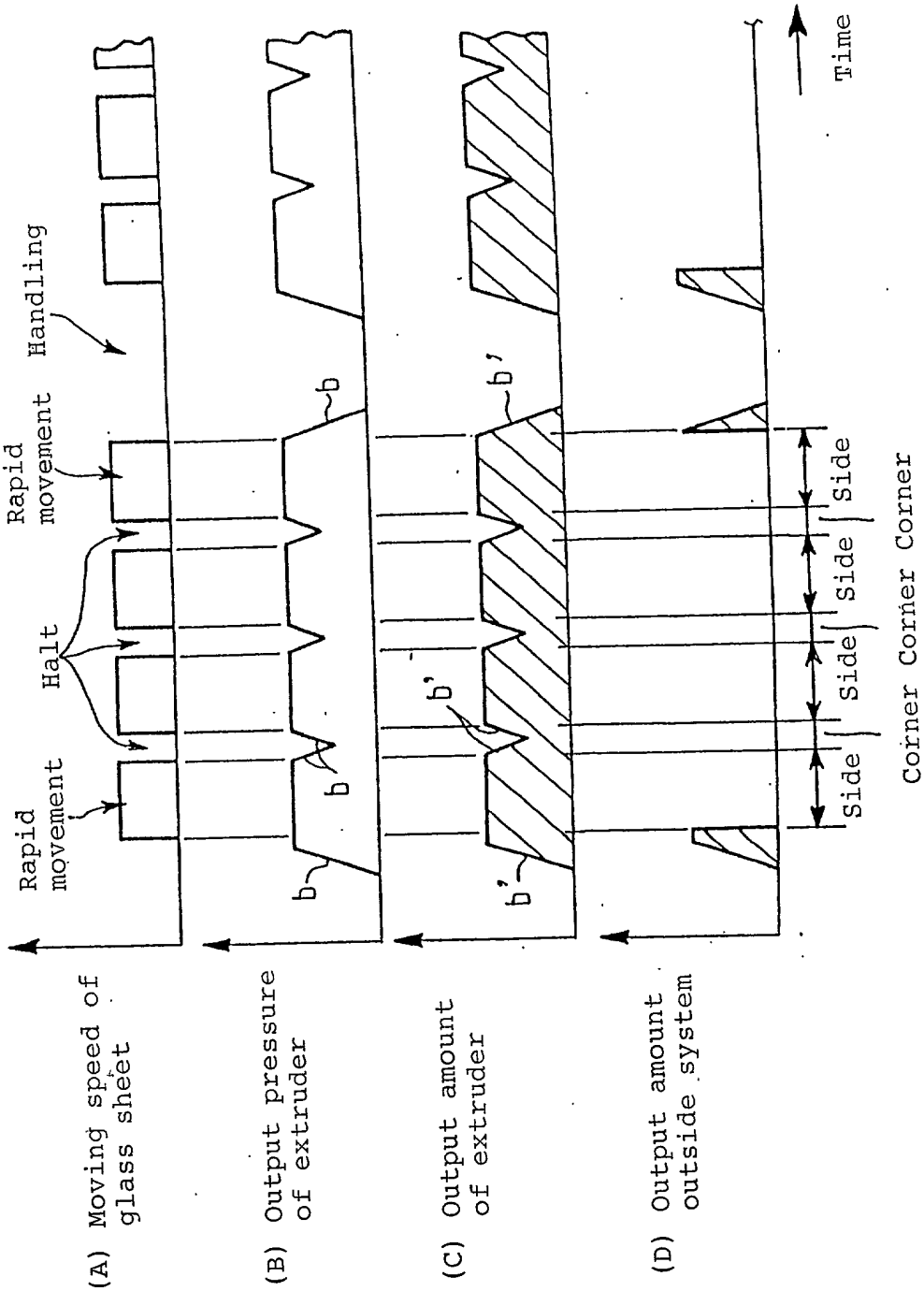

(A) Moving speed of glass sheet
(B) Output pressure of extruder
(C) Output amount of extruder
(D) Output amount outside system
Rapid movement
Halt
Rapid movement
Handling
b
b'
Time
Side
Side
Side
Side
Corner
Corner
Corner

Fig. 10

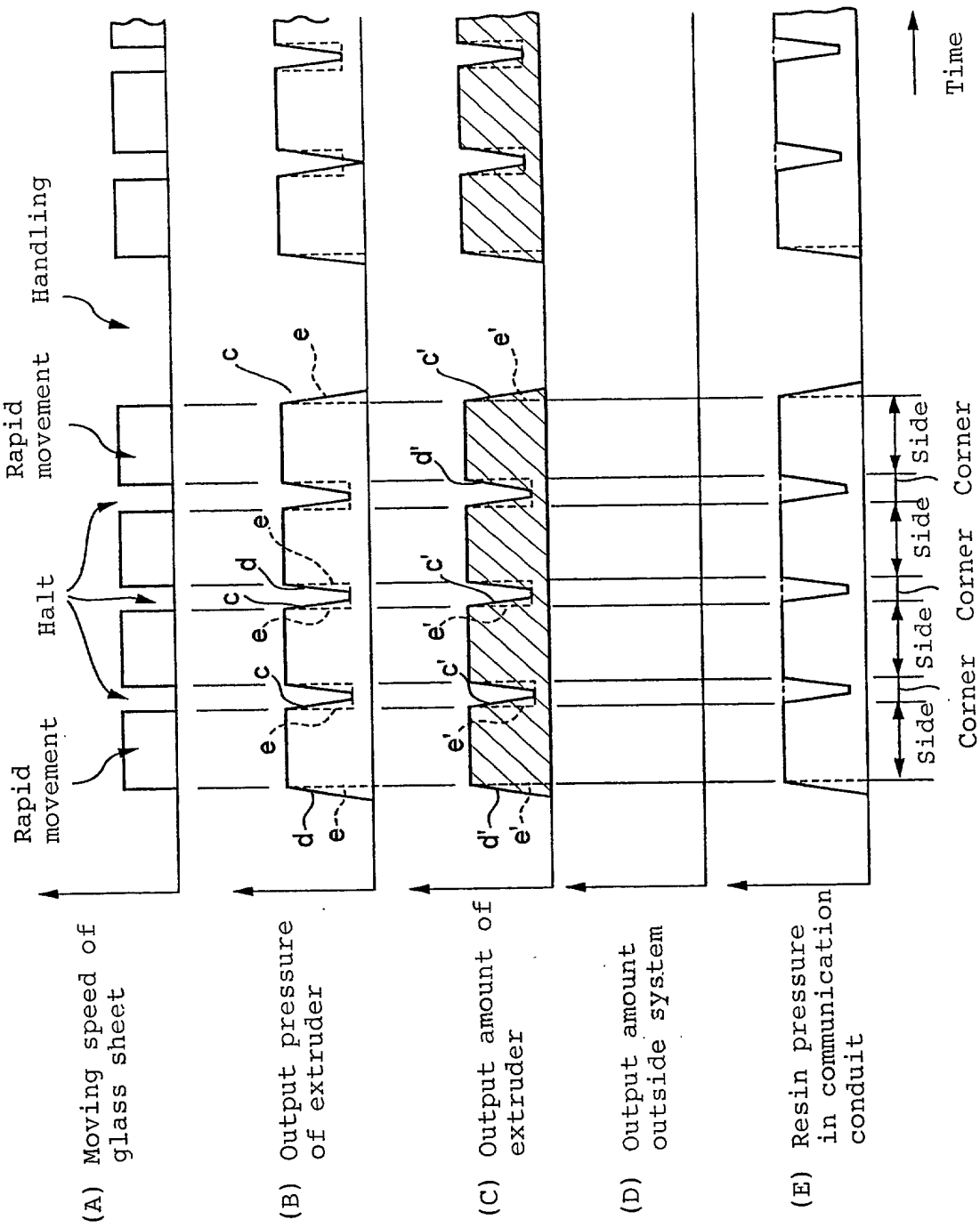
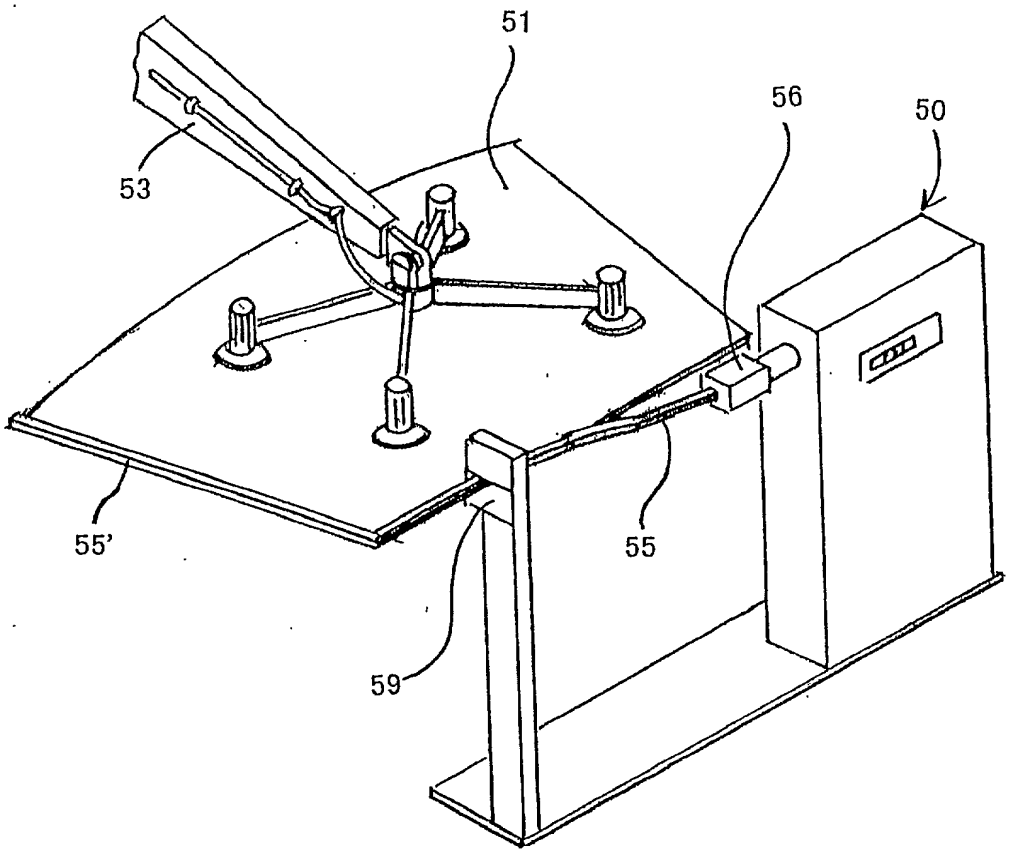

(A) Moving speed of glass sheet
(B) Output pressure of extruder
(C) Output amount of extruder
(D) Output amount outside system
(E) Resin pressure in communication conduit
Rapid movement
Halt
Rapid movement
Handling
Time
Corner
Side
Corner
Side
Side
Corner
Side

Fig. 11



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(F98-60)

Declaration and Power of Attorney for Patent Application

特許出願宣言書

Japanese Language Declaration

私は、下欄に氏名を記載した発明として、以下の通り宣言する：

As a below named inventor, I hereby declare that:

私の住所、郵便の宛先および国籍は、下欄に氏名に続いて記載したとおりであり、

My residence, post office address and citizenship are as stated below next to my name,

名称の発明に関し、請求の範囲に記載した特許を求める主題の本来の、最初にして唯一の発明者である（一人の氏名のみが下欄に記載されている場合）か、もしくは本来の、最初にして共同の発明者である（複数の氏名が下欄に記載されている場合）と信じ、

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

METHOD FOR FORMING A RESINOUS FRAME AND METHOD FOR PREPARING A PANEL WITH A RESINOUS FRAME USING THE SAME

その明細書を
（該当するほうに印を付す）

the specification of which
(check one)

☐ ここに添付する。

☒ is attached hereto.

☐ _____ 日に出願番号

☒ was filed on September 29, 1998 as

第 _____ 号として提出し、

Application Serial No. PCT/JP98/04362

_____ 日に補正した。
（該当する場合）

and was amended on _____
(if applicable)

私は、前記のとおり補正した請求の範囲を含む前記明細書の内容を検討し、理解したことを陳述する。

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

私は、連邦規則法典第37部第1章第56条(a)項に従い、本願の審査に所要の情報を開示すべき義務を有することを認める。

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

Japanese Language Declaration

私は、合衆国法典第35部第119条、第172条、又は第365条に基づく下記の外国特許出願又は発明者証出願の外国優先権利益を主張し、さらに優先権の主張に係わる基礎出願の出願日前の出願日を有する外国特許出願又は発明者証出願を以下に明記する：

I hereby claim foreign priority benefits under Title 35, United States Code §119, §172 or §365 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior foreign applications
先の外国出願

(Number) (番　号)	(Country) (国　名)	(Day/Month/Year Filed) (出願の年月日)	Priority claimed 優先権の主張 Yes あり	No なし
9-266741	Japan	30/September/1997	☒	☐
			☐	☐
			☐	☐
			☐	☐
			☐	☐

私は、合衆国法典第35部第120条に基づく下記の合衆国特許出願の利益を主張し、本願の請求の範囲各項に記載の主題が合衆国法典第35部第112条第1項に規定の態様で先の合衆国出願に開示されていない限度において、先の出願の出願日と本願の国内出願日又はＰＣＴ国際出願日の間に公表された連邦規則法典第37部第1章第56条(a)項に記載の所要の情報を開示すべき義務を有することを認める。

I hereby claim the benefit of Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose any material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Serial No.) (出願番号)	(Filing Date) (出願日)	(現　況) 特許済み、係属中、放棄済み	(Status) (patended, pending abandoned)
PCT/JP98/04362	29/September/1998	Pending	

私は、ここに自己の知識に基づいて行った陳述がすべて真実であり、自己の有する情報及び信ずるところに従って行った陳述が真実であると信じ、更に故意に虚偽の陳述等を行った場合、合衆国法典第18部第1001条により、罰金もしくは禁固に処せられるか、又はこれらの刑が併科され、又はかかる故意による虚偽の陳述が本願ないし本願に対して付与される特許の有効性を損なうことがあることを認識して、以上の陳述を行ったことを宣言する。

I hereby declare that all statements made herein of my own knowledge are true; and further that all statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Japanese Language Declaration

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（代理人氏名及び登録番号を明記のこと）

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith *(list name and registration number)*

I hereby appoint John H. Mion, Reg. No. 18,879; Donald E. Zinn, Reg. No. 19,046; Thomas J. Macpeak, Reg. No. 19,292; Robert J. Seas, Jr., Reg. No. 21,092; Darryl Mexic, Reg. No. 23,063; Robert V. Sloan, Reg. No. 22,775; Peter D. Olexy, Reg. No. 24,513; J. Frank Osha, Reg. No. 24,625; Waddell A. Biggart, Reg. No. 24,861; Robert G. McMorrow, Reg. No. 19,093; Louis Gubinsky, Reg. No. 24,835; Neil B. Siegel, Reg. No. 25,200; David J. Cushing, Reg. No. 28,703; John R. Inge, Reg. No. 26,916; Joseph J. Ruch, Jr., Reg. No. 26,577; Sheldon I. Landsman, Reg. No. 25,430; Richard C. Turner, Reg. No. 29,710; Howard L. Bernstein, Reg. No. 25,665; Alan J. Kasper, Reg. No. 25,426; Kenneth J. Burchfiel, Reg. No. 31,333; Gordon Kit, Reg. No. 30,764; Susan J. Mack, Reg. No. 30,951; Frank L. Bernstein, Reg. No. 31,484; Mark Boland, Reg. No. 32,197; William H. Mandir, Reg. No. 32,156; Scott M. Daniels, Reg. No. 32,562; Brian W. Hannon, Reg. No. 32,778; Abraham J. Rosner, Reg. No. 33,276; Bruce E. Kramer, Reg. No. 33,725; Paul F. Neils, Reg. No. 33,102; and Brett S. Sylvester, Reg. No. 32,765, my attorneys to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith, and request that all correspondence about the application be addressed to SUGHRUE, MION, ZINN, MACPEAK & SEAS, PLLC, 2100 Pennsylvania Avenue, N.W., Washington, D.C. 20037-3202.

書類の送付先： Send Correspondence to:

SUGHRUE, MION, ZINN, MACPEAK & SEAS
2100 Pennsylvania Avenue, N.W., Washington, D.C. 20037

直通電話連絡先： （名称及び電話番号） Direct Telephone Calls to: *(name and telephone number)*

(202)293-7060

唯一の又は第一の発明者の氏名 1st	Full name of sole or first inventor Naoki Okino
同発明者の署名 日付	Inventor's signature Date Naoki Okino 04/10/2000
住所	Residence JPX Yokohama-shi, KANAGAWA 230-0045 JAPAN
国籍	Citizenship Japanese
郵便の宛先	Post office address c/o Asahi Glass Company, Limited
	No. 1, Suehiro-cho 1-chome, Tsurumi-ku, Yokohama-shi, KANAGAWA 230-0045 JAPAN
第二の共同発明者の氏名（該当する場合） 2nd	Full name of second joint inventor, if any Yutaka Ishihawa
同第二発明者の署名 日付	Second inventor's signature Date Yutaka Ishikawa 04/04/2000
住所	Residence JPX Yokohama-shi, KANAGAWA 230-0045 JAPAN
国籍	Citizenship Japanese
郵便の宛先	Post office address c/o Asahi Glass Company, Limited
	No. 1, Suehiro-cho 1-chome, Tsurumi-ku, Yokohama-shi, KANAGAWA 230-0045 JAPAN

（第三又はそれ以降の共同発明者に対しても同様な情報および署名を提供すること。）

(Supply similar information and signature for third and subsequent joint inventors.)

第三の共同発明者の氏名（該当する場合）	Full name of third joint inventor, if any
300	Nobuyuki Tanaka
同第三発明者の署名　日付	Third inventor's signature　Date
	Nobuyuki Tanaka　03/30/2000
住所	Residence
	Yokohama-shi, KANAGAWA 230-0045 JAPAN JPX
国籍	Citizenship
	Japanese
郵便の宛先	Post office address c/o Asahi Glass Company, Limited,No. 1, Suehiro-cho 1-chome,
	Tsurumi-ku, Yokohama-shi, KANAGAWA 230-0045 JAPAN
第四の共同発明者の氏名（該当する場合）	Full name of fourth joint inventor, if any
	Yutaka Mano
同第四発明者の署名　日付	Fourth inventor's signature　Date
4-00	Yutaka Mano　04/04/2000
住所	Residence
	Yokohama-shi , KANAGAWA 230-0045 JAPAN JPX
国籍	Citizenship
	Japanese
郵便の宛先	Post office address c/o Asahi Glass Company, Limited,No. 1, Suehiro-cho 1-chome,
	Tsurumi-ku, Yokohama-shi, KANAGAWA 230-0045 JAPAN
第五の共同発明者の氏名（該当する場合）	Full name of fifth joint inventor, if any
600	Yasuhiro Shibuya
同第五発明者の署名　日付	Fifth inventor's signature　Date
	Yasuhiro Shibuya　03/28/2000
住所	Residence
	Aiko-gun, KANAGAWA 243-0301 JAPAN JPX
国籍	Citizenship
	Japanese
郵便の宛先	Post office address c/o Asahi Glass Company, Limited,426-1, Azakozawauehara,
	Sumida, Aikawa-machi, Aiko-gun, KANAGAWA 243-0301 JAPAN
第六の共同発明者の氏名（該当する場合）	Full name of sixth joint inventor, if any
同第六発明者の署名　日付	Sixth inventor's signature　Date
住所	Residence
国籍	Citizenship
郵便の宛先	Post office address

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